CLAIMS

What is claimed is:

1. A device comprising a first electrode, a pad of resistive material disposed adjacent the first electrode, a second electrode disposed adjacent the pad, and a probe supported on the pad.

2. The device according to claim 1 wherein at least some of the probe is supported on at least one of the first electrode and the second electrode.

3. The device according to claim 1, wherein the first electrode, the second electrode, and the pad are supported on a substrate.

4. The device according to claim 3, wherein a gap is defined between the pad and at least one of the first electrode and the second electrode.

5. The device according to claim 3, wherein the first electrode and the second electrode physically contact the pad.

6. The device according to claim 3, wherein the pad of resistive material defines one or more fissures such that the pad is segmented into a plurality of segments.

7. The device according to claim 1, wherein the substrate comprises a non-conductive layer, said non-conductive layer supporting the first electrode, the second electrode, and the pad.

8. The device according to claim 1, wherein the pad of resistive material comprises a material selected from the group consisting of carbon thin film, metal thin film, metal nitride, nichrom (NiCr), tantalum nitride (Ta_2N), silicon chrome, and metal oxide.

9. The device according to claim 1, wherein the probe comprises at least one of the group consisting of polypeptides, polynucleotides, glycoproteins, polysaccharides, hormones, growth factors, peptidoglycans, ribonucleotides, deoxyribonucleotides, modified nucleosides, peptide nucleic acids, and oligomeric nucleoside phosphonates.

10. A microarray comprising a plurality of devices according to claim 1 supported on a substrate in an array format.

11. The microarray of claim 10, wherein each of the plurality of devices comprises a different probe.

12. The microarray of claim 10, wherein the microarray comprises at least one reference device.

13. The microarray of claim 10, wherein at least a plurality of the first electrodes of the plurality of devices are in electrical communication with a common bus disposed on or in the substrate.

14. The microarray of claim 10, wherein each of the plurality of devices has a gap defined between the pad of said device and at least one of the first electrode and the second electrode of said device.

15. The microarray of claim 10, wherein the first electrode and the second electrode of each of the plurality of devices physically contact the pad of the respective device.

16. The microarray of claim 10, wherein the pad of resistive material of each of the plurality of devices defines one or more fissures such that the pad is segmented into a plurality of segments.

17. The microarray of claim 10, wherein the substrate comprises a non-conductive layer supporting the plurality of devices.

18. The microarray of claim 10, wherein the probe of each of the plurality of devices comprises at least one of the group consisting of polypeptides, polynucleotides, glycoproteins, polysaccharides, hormones, growth factors, peptidoglycans, ribonucleotides, deoxyribonucleotides, modified nucleosides, peptide nucleic acids, and oligomeric nucleoside phosphonates.

19. A method of detecting a target in a sample comprising the target, the method comprising

(a) contacting a device with the sample, the device comprising a plurality of electrodes adjacent a pad of resistive material and a probe supported on the pad of resistive material;

(b) applying an enhancement reaction to the device to result in a change in at least one observable property of the device;

(c) measuring the observable property using at least one of said plurality of electrodes; and

(d) using the result of (c) to detect the target.

20. The method of claim 19 wherein the observable property is selected from the group consisting of resistance, impedance, conductance, capacitance, current, potential, transmission of a signal between the two electrodes.

21. The method of claim 19 further comprising (e) attaching a label to the target prior to applying the enhancement reaction.

22. The method of claim 21 wherein the label comprises a metal nanoparticle selected from the group consisting of a gold nanoparticle and a silver nanoparticle.

23. The method of claim 22 wherein the enhancement reaction deposits metal onto the metal nanoparticle.

24. The method of claim 21 wherein the label is attached to the target via a conjugate binding pair selected from the group consisting of biotin-avidin and digoxigenin-antidigoxigenin.

25. The method of claim 19, wherein a plurality of devices are contacted with sample, wherein the plurality of devices are supported on a single substrate, wherein each device of the plurality of devices is adapted to bind a different target.

26. A method of analyzing a sample for a plurality of targets, the method comprising

(a) contacting an array of devices with the sample, each device comprising a plurality of electrodes adjacent a pad of resistive material and a probe supported on the pad of resistive material;

(b) applying an enhancement reaction to the result of (a) to result in a change in an observable property of each of a subset of the devices on the array of devices;

(c) measuring the observable property at each of the subset of devices using at least one of said plurality of electrodes of each device of the subset; and

(d) evaluating the results of (c) to analyze the sample for the plurality of targets.

27. The method of claim 26, wherein the observable property is selected from the group consisting of resistance, impedance, conductance, capacitance, current, potential, transmission of a signal.

28. The method of claim 26, further comprising (e) attaching a label to the targets prior to applying the enhancement reaction.

29. The method of claim 28, wherein the label comprises a metal nanoparticle selected from the group consisting of a gold nanoparticle and a silver nanoparticle.

30. The method of claim 29, wherein the enhancement reaction deposits metal onto the metal nanoparticle.

31. The method of claim 28, wherein the label is attached to the target via a conjugate binding pair selected from the group consisting of biotin-avidin and digoxigenin-antidigoxigenin.